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# The Amphibians and Reptiles Collected by the University of Michigan-Walker Expedition in Southern Vera Cruz, Mexico.

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With Plates 6-11.

In December, 1910, it was announced to the Board of Regents of the University of Michigan that Mr. BRYANT WALKER, Detroit, Michigan, proposed to give to the Museum the funds necessary to cover one half of the expenses of a zoological expedition to southern Vera Cruz, Mexico, if the University would bear the rest of the expense. The conditions of the gift were met by the Board of Regents with a special appropriation, and the work of organizing and conducting the expedition was given to the writer as Head Curator of the Museum.

It was thought best for several reasons to confine the work to a few groups, so the writer elected to limit the party to two men, and the groups to receive particular attention to the molluscs, amphibians and reptiles. Mr. H. B. BAKER, assistant in the zoological department of the university, was engaged to collect molluscs, and the writer gave his primary attention to amphibians and reptiles. No opportunity was lost, however, to collect other forms when this did not interfere with the work on the above mentioned groups, so that a considerable amount of miscellaneous material was

obtained, but the only other group that was collected at all extensively was the Crustacea, the specimens of which have been studied and reported upon by Dr. PEARSE.<sup>1)</sup>

The region chosen for investigation was in the Canton of Acayucan in southern Vera Cruz. Headquarters were established on the hacienda of the Cuatotolapam Sugar Company, which lies between the San Juan River and the San Andreas Tuxtla Range, northeast of the station of Rives on the Vera Cruz al Istmo R. R. The immediate region of the hacienda (viz., between the San Juan River, Arroyo Negra, Laguna de Chacalapa and the San Andreas Tuxtla Range, see Pl. 6) was worked in as much detail as possible in the six weeks (July 10 to August 20) spent in the field, and a few days were spent in a reconnaissance in the mountains about Lake Catemaco.

### Topography.

The country lying between the San Juan River and the San Andreas Tuxtla Mountains, which received most of our attention, is a gently rolling plain. The altitude of this plain is low. Mr. H. B. REESE, Assistant Chief Engineer of Construction of the National Railroads of Mexico, informs me that the elevation of the banks of the San Juan River at the proposed crossing near the hacienda is 15 meters above sea-level. The most conspicuous elevations on this plain are the groups of Indian mounds along the streams. Of the streams traversing the region, Arroyo Negra, La Laja Creek, Hueyapam and San Juan Rivers, the first three are tributaries of the latter. Owing to the level nature of the topography the drainage is rather poor. The streams all have a low gradient soon after leaving the mountains and flow sluggishly through beds of alluvium. There are numerous shallow ponds, some of which are doubtless dry except during the rainy season. They were all filled with water during the summer. These ponds are mostly small, but one, the Laguna de Chacalapa, is about a mile in length, altho apparently not over one meter deep.

East of the flood plain of the Hueyapam River the land rises rapidly to the foot hills of the mountains. The latter appear to be

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1) Report on the Crustacea collected by the University of Michigan-Walker Expedition in the State of Vera Cruz, Mexico, in: 13. Ann. Rep. Michigan Acad. Sc., p. 108.

largely volcanic in nature. In the heart of the range lies the Laguna de Catemaco, one of the few large lakes in the Republic. The lake is several miles in diameter and lies in a deep basin and is surrounded by sharp conical elevations of several hundred feet. The bottom consists of volcanic debris in the form of small and large fragments, and there are several large rock islands. It has the appearance of being a very large crater lake, and the surrounding elevations are apparently subsidiary cones of the extinct volcano.

#### Climate.

The region lies within the tierra caliente of HANN and CALVERT's <sup>1)</sup> Zone III — the zone characterized by a mean annual temperature of 68—77° F. As said before, the elevation of the plain is about 15 meters.

The nearest stations where meteorological observations have been made are San Juan Evangelista (88 m) and Acayucan (158 m). According to the table given by CALVERT <sup>2)</sup>, the mean annual temperature for a period of five years is for the former 74,3° and for the latter 76,1°. It is safe to conclude that the mean annual temperature of Cuatotolapam is very close to 75°. This places the region climatologically (cf. CALVERT's map) very near to CALVERT's Zone II, and it might be considered to be intermediate in respect to climate. According to Mr. LA RUE, the hottest months are April and May, and the coldest January and February.

We recorded the temperatures for forty days at Cuatotolapam (July 10 to August 18) and these may be summarized as follows:

#### Maximum and Minimum Temperatures for July and August, 1910.

Highest	94° F
Date	Aug. 4
Average Maximum	89,4°
Lowest	61,5°
Date	July 22
Average Minimum	71,6°
Mean	80,5°
Average Daily Range	17,7°
Greatest Daily Range	28,5°

1) in: Proc. Acad. nat. Sc. Philadelphia, 1908, p. 474.

2) in: U. S. Weather Review, 1908, p. 93—97.

It will be seen from the above table that the summer temperature is not excessively high, and that the daily range and variation from day to day are relatively small.

There are two well marked seasons — the wet season from July to October inclusive and the dry from November to June. From January to the middle of the year we were informed that it rarely rains at all. The wettest month is September. It rained on twenty seven of the forty days between July 10 and August 18. In this season and owing partly to the poor drainage, the streams become greatly swollen, and the water accumulates everywhere between the low elevations, so that there are numerous ponds.

### Vegetation.

The region supports the savannah type of forest and grass land described by SCHIMPER<sup>1)</sup> and SCHOMBURGK. Along the streams there is a luxuriant forest growth, characterized by large trees and an abundance of lianes and epiphytes (Figs. 5, 6, 9). On the higher ground this forest is replaced by grassy savannahs dotted with groves of stunted trees (Figs. 3, 7). These groves vary in size from a few trees or bushes to tracts of woodland or thickets several hectares in extent, the trees when solitary showing the umbrella form described by SCHIMPER<sup>2)</sup> (Fig. 7).

Most of the clearing that has been done on the hacienda has been at the expense of the lowland forests (Fig. 6). The fields are planted to cane, — about 3,000 acres in 1910. The fields are, of course, kept free from other vegetation, but the cane grows rank and high so that the environmental conditions are in some respects similar to those in the woods, at least as far as the ground-loving animals are concerned (Fig. 10). They are, however, disturbed by frequent cultivation, which includes cutting and burning. There is evidence that the savannah grassland also represents artificially cleared areas (see page 302).

### The Amphibian-Reptile Fauna.

It is hardly necessary to say that the reptile-amphibian fauna is South American in its affinities, and this subject need not be

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1) SCHIMPER, A. F. W., *Plant Geography* (English Edition), p. 370—376.

2) *l. c.*, p. 347.



dwelt upon. But so little work has been done upon the habitat relations of the Middle American forms that a summary of those of the species studied will not be out of place.

From the standpoint of the amphibians and reptiles seven major habitats may be recognized in the region studied. (The mountain forests Fig. 1, were not studied.)

Lowland forests. — The dense jungle that now occupies the low ground. The trees are large and form a dense shade (Figs. 5, 9).

Lowland forest clearings. — These are grass-grown or thicket-covered areas that have resulted from the clearing of the lowland forests. The cane fields are included here (Figs. 6, 10).

Lowland forest ponds. — The pools that occur throughout the jungles during the rainy season.

Rivers and lakes. — All the streams — San Juan, Hueyapam, La Laja and Arroyo Negra — are included here with Lake Catemaco. The animals considered characteristic of these bodies of water are both aquatic and semi-aquatic forms (Figs. 8, 9).

Savannah forests and thickets. — The areas of woodland on the higher parts of the plain. These may consist of rather extensive forests or be limited to a few trees or to larger or smaller areas covered with low bushes (Figs. 3, 7).

Savannah grassland. — The grass covered areas on the higher parts of the plain and surrounding the patches of savannah forest. Where studied the grass was kept short by grazing (Figs. 3, 7).

Savannah ponds. — Numerous shallow ponds dot the savannah, and these all contain water during the rainy season. The largest pond investigated was the Laguna de Chacalapa, which is roughly a mile long by one half mile wide and less than a meter in depth except where a ditch has been dug at one end.

An analysis of our material indicates that the habitat distribution of the amphibians and reptiles obtained is as shown in the table on page 300—301.

It is hardly necessary to point out that further work will modify the habitat distribution of the species as expressed by this table. It is highly improbable that we found each species in all of the habitats in which it occurs, and there are, with little doubt, many other species that frequent the different sets of conditions studied. On the other hand, it is believed that the general results will not be vitiated, as particular attention was given to habitat study and an effort was made to collect specimens of all species in each habitat.

## Habitat distribution of the

Habitats	Lowland Forests	Lowland Forest Clearings, grass grown or thickets	Lowland Forest
Arboreal or Arboreal and Amphibious	<i>Anolis biporcatus</i>	—	—
	<i>Anolis sallaei</i>	<i>Anolis sallaei</i>	—
	<i>Constrictor c. imperator</i>	<i>C. c. imperator</i>	—
	—	—	—
	<i>Ctenosaura a. completa</i>	—	—
	<i>Hyla baudini</i>	<i>H. baudini</i>	—
Terrestrial	<i>Ameiva undulata</i>	<i>A. undulata</i>	—
	—	<i>Sceloporus variabilis</i>	—
	—	—	—
	<i>Spilotes c. couperii</i>	<i>S. c. couperii</i>	—
	—	<i>Dermophis mexicanus</i>	—
	<i>Spelerpes variegatus</i>	—	—
Amphibious or Amphibious and Terrestrial	<i>Coleonyx elegans</i>	<i>C. elegans</i>	—
	—	—	—
	—	—	—
	—	<i>Elaps fulvius</i>	—
	—	<i>Mabuya agilis</i>	—
	<i>Leptodactylus caliginosus</i>	<i>L. caliginosus</i>	<i>L. caliginosus</i>
Aquatic	—	<i>Leptodactylus albilabris</i>	<i>L. albilabris</i>
	—	—	—
	—	<i>Rana austriicola</i>	—
	—	—	—
	<i>Bufo calliceps</i>	<i>B. valliceps</i>	<i>B. valliceps</i>
	—	<i>Bufo marinus</i>	<i>B. marinus</i>
Aquatic	—	—	<i>Engystomops pustulosus</i>
	—	—	—
	—	—	—
	—	—	—
	—	—	—
	—	—	<i>Chelydra rossignoni</i>

The most striking fact shown by the table is the very small number of forms found on the savannah grassland. It will be noted that the only form that was not found elsewhere is the snake *Erythrolamprus imperialis*. This has little significance for this snake is a small and secretive form and only two specimens were found —

## Reptiles and Amphibians.

Ponds, Rivers and Lakes	Savannah Forests and Thickets	Savannah Grassland	Savannah Ponds
—	—	—	—
—	<i>A. sallaci</i>	—	—
—	—	—	—
<i>Iguana i. rhinophyla</i>	—	—	—
—	<i>C. a. completa</i>	—	—
—	—	—	—
—	<i>A. undulata</i>	—	—
—	<i>S. variabilis</i>	—	—
—	<i>Cnemidophorus</i> <i>deppii</i>	—	—
—	<i>S. c. couperii</i>	<i>S. c. couperii</i>	—
—	<i>D. mexicanus</i>	—	—
—	—	—	—
—	—	—	—
—	<i>Leptodeira perso-</i> <i>nata</i>	—	—
—	—	<i>Erythrolamprus im-</i> <i>perialis</i>	—
—	—	—	—
—	—	—	<i>L. caliginosus</i>
—	<i>L. albilabris</i>	<i>L. albilabris</i>	<i>L. albilabris</i>
<i>Basiliscus vittatus</i>	—	—	—
<i>R. austricola</i>	—	—	—
<i>Rana palmipes</i>	—	—	—
—	—	<i>B. valliceps</i>	<i>B. valliceps</i>
—	—	<i>B. marinus</i>	<i>B. marinus</i>
—	—	—	<i>E. pustulosus</i>
—	—	—	<i>Thamnophis s.</i> <i>proximus</i>
<i>Crocodilus ameri-</i> <i>canus</i>	—	—	<i>C. americanus</i>
<i>Dermatemys mawii</i>	—	—	—
<i>Staurotypus tripor-</i> <i>catus</i>	—	—	—
<i>Claudius angustatus</i>	—	—	—
—	—	—	—
<i>Geomyda p. areolata</i>	—	—	—

under logs on the shores of ponds. Of the other forms found on the savannah grassland, the gopher snake, *Spilotes corias couperi*, was of general distribution in upland habitats, and the amphibians, *Leptodactylus albilabris*, *Bufo valliceps* and *Bufo marinus*, were found under logs and boards and were also of quite general distribution. *Thamn-*

*ophis sauritus proximus* was found in small numbers about the ponds, but it was quite aquatic, and is placed in the pond habitat.

The meagreness of the fauna of the savannah grassland is shown more strikingly when the scarcity of individuals is considered with the small number of species. The habitat was worked carefully, and everywhere specimens were very rare except of the three species of amphibians noted, and these were far from common anywhere even on the immediate shores of ponds.

The mammals and birds of the savannah grassland are also apparently few in individuals and species. We observed no species of these groups to be abundant in this habitat with the exception of the Stone Curlew, *Oedienemus bistratus* (WAGLER), and only three that could be considered characteristic. The stone curlew and a meadow lark were observed nowhere else, the former rather abundantly, and a pocket gopher was found here but more commonly in the lowland clearings.

The fact that the savannah grassland supports no characteristic vertebrate fauna seems to the writer to support very strongly the conclusion of O. F. Cook<sup>1)</sup> (for Central America) that such grassland areas represent old artificial clearings. It is known that the region about Cuatotolapam was many years ago utilized as a cattle ranch by the Spaniards, and at the present time thousands of cattle are pastured there. The original clearing may have been done by the cattlemen or the latter may have found the area already, at least partially, cleared by the methods of agriculture practiced by the natives (cf. Cook). But the continued exclusion of the trees and the development of the grassland associations may be attributed to the constant grazing.

The savannah forests and thickets also have a scanty amphibian-reptile fauna, but the latter is richer in species and individuals than that of the grassland. The only forms that were not found elsewhere are *Leptodeira personata*, one specimen of which was seen (in a thicket), and *Cnemidophorus deppei*. *Ameiva undulata*, *Sceloporus variabilis*, *Ctenosaura acanthura completa* and *Anolis sallaei* are rather characteristic of this habitat, but they were also found in partial clearings on low ground. The other forms observed here were only seen a very few times. The ponds on the savannah also have but a small fauna. The amphibians, *Leptodactylus albilabris*, *L. caliginosus*,

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1) in: U. S. Dept. Agricult. Bureau of Plant Industry, Bull. 145.

*Bufo valliceps*, *Bufo marinus* and *Engystomops pustulosus*, with *Crocodilus americanus* and *Thamnophis sauritus proximus*, were found about the ponds, but these species were represented by only a few individuals, and only *T. s. proximus* was found nowhere else. These species were, with the exception of the gartersnake, found much more commonly about the lowland forest ponds.

The lowland habitats were by far the richest in species and individuals. It will undoubtedly develop that all of the species found on the savannah occur much more numerously in the lowland habitats, and, as has been said, all but three savannah species (*Erythrolamprus imperialis*, *Thamnophis sauritus proximus* and *Cnemidophorus deppei*) in our collection were also found on the lowlands. Upon analysis it is seen that the lowland forests and the rivers and lakes are the richest in individuals and species. The clearings contain principally such ground forms from the forest as are able to live in the more open conditions (with the amphibious species that can endure the same conditions, e. g., *Rana austricola*), and the ponds the more aquatic species from the forest with the young of river and lake forms that come to the land to breed (e. g., *Chelydra rossignoni*).

It is believed, then, that the general statement can be made that there are two groups of natural habitats in the region-, the forest, and the rivers and lakes. When the lower lands are cleared many of the ground and semi-aquatic forms persist, the former in the rank grass or in the canefields, the latter about the ponds. If the land is higher and extensively cleared and grazed some of the ground forms may still linger in diminished numbers in the clumps of woodland that are not destroyed and most of the aquatic species also in small numbers in the ponds, but the grassland areas constitute conditions so different from those to which even the ground forms from the forest are accustomed that very few species persist and these only in very small numbers.

#### Acknowledgements.

In the progress of the work, I have become indebted to a number of persons for very material assistance. To be acknowledged particularly is the assistance of the managers of the hacienda, — Mr. J. C. HITCHMAN, Gerente, Mr. THOMAS LA RUE, Sub-Gerente, Mr. FRANK LEHMER and Mr. PHILIPP LEHMER. Mr. HITCHMAN kindly permitted us to make the hacienda our headquarters, and Messrs. LA RUE and FRANK and PHILIPP LEHMER, who were on the plan-

tation during the work, were untiring in their efforts to assist us in obtaining results. The generous assistance of these men not only added greatly to the data obtained but also made the work very pleasant for us. I must also acknowledge the assistance of my wife, FLORENCE HEGLE RUTHVEN, who accompanied me on most of my tramps in the field, collected a large number of specimens, and did much of the work on the color determinations.

To Dr. LEONARD STEJNEGER I am greatly indebted for assistance in determining the material of several species. He examined specimens of *Rana austricola*, *Rana palmipes*, *Coleonyx elegans*, *Anolis biporcatus*, *Claudius angustatus* and *Geomyda punctularia areolata* and gave me the results of his study.

The prints of the photographs and the map were prepared by my assistants, Miss CRYSTAL THOMPSON and Miss HELEN THOMPSON.

### List of Species.

In the opinion of the writer no apology need be made for the space given to the discussion of variation, habits and habitat distribution, in the following list. Our knowledge of the variation and habits of most of the Mexican species is very meager, and contributions to these subjects should assist very materially in the determination of the relationships of the forms.

The color notes were made on fresh material in the field, and the numbers refer to the "Code des Couleurs" by KLINCKSIEK & VALLETE.

#### *Dermophis mexicanus* (DUMERIL et BIBRON).

Not uncommon at Cuatotolapam. Known locally as the "mano de metate".<sup>1)</sup>

The 2 specimens obtained differ from the descriptions of the species in having 185 and 186 folds. The form is stout, the circumference being one-sixth to one-seventh of the length. The smaller specimen measures 350 mm in length and 58 mm in circumference. The color descriptions of this species are quite inaccurate, probably because they have been based upon preserved material. In life the color above is uniformly dark violaceous olive (514). This color, becoming somewhat paler (518), is continued well below the lateral

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1) From its resemblance in form to the stone roller used by the indian women to crush the corn on the "metate".



ridges, but on the middle of the ventral surface is confined to the grooves except on the chin, throat and tail which it covers uniformly. The middle of the belly, with the exception of the grooves, is a pale bluish violet (0496).

Only 2 specimens of this apodal amphibian were observed by us but this is to be attributed to the secretive habits of the species which is apparently not uncommon in the region. One specimen was found by the writer in an ant nest beneath a decaying stump in a grove on the prairie. The other was found early in the morning, crawling along a guarda raya in the cane fields. The Indians told us that individuals are often turned out by the plows, and Mr. LA RUE informed us that he has seen them very often early in the morning crawling through the wet grass, but never later in the day. It thus seems that while they are mostly subterranean in habits they are accustomed to move about to a considerable extent on the surface of the ground at night, at least during the rainy season.

*Spelerpes variegatus* (GRAY).

A single specimen taken at Cuatotolapam.

The yellow is present as a dorsal band that is only broken up on the head, by a few small spots on the nape and by two small spots near the edge on the back. In life this band was, on the body orange yellow (177) in the middle, shading into pale yellow (241) on the sides, and on the tail light orange (141).

This specimen was found among the leaves in the woods along La Laja Creek. It had in its mouth the remains of a ground beetle. In this habitat the yellow dorsal band has a highly concealing function. It is of almost exactly the same color as the fallen leaves among which the animal is found, so that if any part of the back becomes exposed (as it probably frequently does) when the animal is crawling about it is inconspicuous.

*Rana austricola* COPE.

15 specimens at Cuatotolapam.

Our material agrees closely with the descriptions of the *R. leconti* of various authors (not of BAIRD and GIRARD). In life the colors of five specimens was as follows: ground color above dark brownish olive (135, 155), occasionally speckled with bright green (331); stripe on canthus rostralis and dorsal spots black or blackish,

the latter margined with greenish (293, 331); stripe along upper lip light greenish yellow (261, 266), frequently much broken up; lateral fold light greenish yellow (266) to orange brown (128, 153); belly white.

The specimens all show the long head and acuminate snout characteristic of the form.

#### Measurements.

Length	90,5	50	55,8	57,5	69,5	78	69
Head	32,5	20	21,5	22	26	31,5	25,5
Snout	17	9,5	9,5	10	13	16	12

At Cuatutolapam, *R. austricola* has much the same habits as *R. pipiens* in more northern localities. It was found in grassy places along the small streams and ditches, and in the tall grass in low places. It can hardly be called common, for while it was abundant in some places, viz., along a drainage ditch in the cane fields, it was only rarely observed along the streams and in grassy places. This may be due to the fact that it prefers more open places than the timbered shores of the streams, and more grassy places than are left along most of the bodies of water after the woods have been cleared away and the land placed under cultivation or given over to grazing.

#### *Rana palmipes* SPIX.

Observed along La Laja Creek and on the shores of Lake Catemaco, but nowhere else. The single specimen obtained is in poor condition, but is clearly referable to the *R. palmipes* of authors.

The species was observed in some numbers along La Laja Creek, and at Lake Catemaco, but specimens were very difficult to secure. It was found only where the shores were densely covered with vegetation, usually where there were bushes hanging low over the water. In such places the individuals stayed well out from shore, upon sticks or low branches, and upon the slightest alarm leaped into the water, where they were very difficult to see even when partially above the surface.

#### *Leptodactylus caliginosus* GIRARD.

Not uncommon at Cuatutolapam and Lake Catemaco.

The specimens obtained need little description. In those in

which the color was examined in life the ground color above was brownish orange (138), the margin of the occipital spot a pale dull yellow (153d), and the ventral parts black and white or gray and white. The colors of the dorsal surface are frequently darker however, and the pale margin of the occipital spot is not always well defined. The dark head markings are quite regular in arrangement, consisting of a band along the canthus rostralis, one from the lower part of the anterior margin of the orbit to the mouth and two from the posterior margin of the orbit on the neck, the lower involving the tympanum. These dark bands with the occipital spot are usually margined with pale yellow, and the pale lines that margin the dark bands on the canthus rostralis are often connected with the anterior margin of the occipital spot to form a triangle. These light bands are frequently more or less obsolete, occasionally entirely so.

This little amphibian, while not uncommon in the region studied, is so secretive as to be little in evidence. We only found it under logs or other decaying vegetable debris in the vicinity of water. It is quite generally distributed on low ground, however, occurring both in the woods and on the prairie. It breeds in the lowland forest pools and in swampy places on the shores of Lake Catemaco, in July and August, and immature individuals were taken in both places.

*Leptodactylus albilabris* (GÜNTHER).

Common at Cuatutolapam.

Our specimens of *L. albilabris* agree closely with the careful descriptions of BOULENGER (Cat. Bat. Sal., p. 245—246) and STEJNEGER (in: Rep. U. S. nation. Mus., 1902, p. 574—577). In the adults the tibio-tarsal articulation reaches the eye. In life most of those observed were a pale orange brown (162) above, although many were more clay colored (about 167 and 172). In all of the adults the dorsal spots are black or very dark brown and in many the occipital triangle is more or less broken up by a pale center. In all but one of the adults the ventral parts are immaculate except for a dark marbling along the lower lip. In one specimen the sides of the chin are finely sprinkled with brown. In most young specimens the dorsal spots are as in the adults, but in some the dorsal spots are so pale as to be rather obscure.

This species is about as common as *L. caliginosus* in the region about Cuatutolapam, but it is more conspicuous. It was found with

the latter under logs in damp places, but it was also taken in numbers in the grass and low vegetation both near the ponds and on higher ground. It breeds in the ponds and in July and August numbers were observed about the shores of the temporary pools in low partially cleared woods, and in swampy places on the shore of Lake Catemaco.

*Engystomops pustulosus* (COPE).

Not uncommon at Cuatotolapam.

The colors of this species have not been accurately described, probably because the red fades rapidly in alcohol. The ground color above is gray, relieved by irregular black blotches. Most of the warts on the head and nape and a few on the body are dull orange (142) or red orange (78c or 78d), as are also the light coccygeal line, the broad light area on the fore limbs, and more or less of the light cross bands on the hind limbs, particularly on the feet. The light spot in the interscapular region and the one on either side of the back are present in all specimens, and, with the line of enlarged warts behind the angle of the mouth, are usually very pale yellow, but occasionally red. The line in the coccygeal region is usually well defined only to the pair of large blotches in the lumbar region. It is occasionally continued narrowly to the broad black margin of the interscapular spot, and occasionally beyond this to the snout, in which case it is interrupted by the supraocular band. In the single very young example these three light vertebral marks form a narrow line from snout to anus, that is narrowly interrupted in the same places as in the adults. With the exception of a median line, the chin throat and breast are gray, generally profusely spotted with black or brown and generally somewhat speckled with pale yellow. The median line, which is present even in very young specimens, is whitish, or pale yellow, which is the dominant color of the abdomen, the dark color of the chin, throat and breast being broken up into large spots on the posterior part of the ventral surface.

This little toad was found in about the same places as *B. valliceps*, but seemed to prefer the wetter places and was more secretive. It was most numerous under logs and decaying vegetation in a low partially cleared area along La Laja Creek (Fig. 6), but it was also found under logs on the shore of the prairie ponds, and in the banana grove at San Juan. During the rains it was found at night

in the pools, and an immature specimen that had but recently emerged from the tadpole stage was found on the shores of a temporary pond on La Laja Creek, August 14. The note is a low chirp that is repeated regularly at intervals of one second.

***Bufo calliceps* WIEGMANN.**

Common at Cuatutolapam.

*Bufo calliceps*, unlike *B. marinus*, is a toad of the fields and woods and is not found commonly about the settlements. We found the adults in the densest jungle, in the more open woods and in one instance under a log on the shore of a pond on the savannah. The woods seems to be the preferred habitat of the adults. They mostly lay their eggs in the ponds in the woods, but they also come out on the savannah or into the cleared or partially cleared areas to lay their eggs in the temporary ponds. Most of the young specimens obtained were taken about the temporary ponds in a low partially cleared area along the margin of the jungle, and on the flood plain of the San Juan River.

***Bufo marinus* (LINNAEUS).**

Very common both at Cuatutolapam and Lake Catemaco.

The large series of specimens obtained exhibit few differences from the descriptions that merit notice. In the large individuals the dark dorsal blotches are very obscure or wanting and the pale vertebral stripe is obsolete. In the young the former are black and conspicuous, and the vertebral line is very distinct. In many of the large specimens the belly is washed with pale red (28d) or orange red (53d) in life. This color fades quickly in alcohol. The largest specimen measures 170,5 mm.

*B. marinus* may be considered the common toad of the region. Like *B. americanus* in northeastern North America, it is found in numbers about human habitations<sup>1)</sup>, coming out at night to feed about the lights. It was very common about the towns on the Hacienda de Cuatutolapam and in the pueblo of Catemaco. Two specimens were found under logs on the margin of a prairie pool, and numerous young that had but recently completed metamorphosis were found in the pools on low partially cleared land along

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1) As noted by COPE, in: Journ. Acad. nat. Sc. Philadelphia, 1875, p. 191.



La Laja Creek, on the flood plain of the San Juan River and about the shores of Lake Catemaco.

*Rhinophrynus dorsalis* DUMERIL et BIBRON.

Two specimens were taken from the stomach of a specimen of *Spilotes corais couperi* at Cuatotolapam.

Only one of the specimens obtained is in good condition. In this one the light markings consist of a vertebral line (interrupted on the middle of the back and in several places on the head), a large spot over each shoulder and several obscure ones on the sides of the back. These light markings were all of a bright pink color when the animal was removed from the snake.

The specimens referred to above were the only ones observed. They were probably captured by the snake in or about the pond in the cane fields where the latter was taken. The snake was found on the margin of the pond on the morning following a heavy night rain, and large numbers of toads and tree toads were breeding there at the time. This species is undoubtedly a burrower, and probably came out at this time to breed, as the various species of *Scaphiopus* do under similar conditions.

*Hyla baudini* DUMERIL et BIBRON.

Common at Cuatotolapam.

There was much variation in color in the specimens of *H. baudini* which we examined in life. Occasional individuals were a dull orange (about 153d) above, but in by far the greater majority the ground color of the back was dark olive green (230), dark olive (180), dark brown (130 or 155) or dark orange (105). The head was a shade lighter than the ground color in most specimens, and the pale spot varied from a pale dull greenish tint (203d) to a very pale yellow (221) or bright green (336). The belly was nearly always a light orange tint (116, 121, 136), and the light spots on the sides light orange yellow (191). The dark markings vary greatly in distinctness. In the paler individuals they are usually indistinct or even entirely wanting, except for faint traces. In those which have a darker ground color they are usually distinct, particularly the black stripe from the tympanic region to the shoulder. They also vary in arrangement, for they may either be connected into a more or less irregular dorsal stripe or stripes, beginning with the cross band



between the eyes, or they may be in the form of irregularly extended spots.

We found *H. baudini* common at Cuatotolapam. Most of the specimens were taken during night rains on the banana trees at San Juan (Fig. 2). At these times they were very noisy. During the day we found them secreted under boards, in the bases of the leaves of such large leaved plants as the "elephant ears", bananas, etc. They were observed breeding in a pond near La Laja Creek on July 17.

*Colconyx elegans* GRAY.

2 specimens seen and one taken at Cuatotolapam.

In life the ground color of this specimen was reddish brown, the crossbars black and the interspaces whitish.

The only two individuals seen were under boards in the sheds at San Juan.

*Anolis biporcatus* (WIEGMANN).

3 specimens taken at Cuatotolapam.

The specimens obtained agree closely both in scutellation and measurements (see below) with those described by BOULENGER (Cat. Liz. Brit. Mus., Vol. 2, p. 88), and thus like his material differ from the specimen described by BOCOURT (in: Miss. sc. Mexique, Rept., p. 98) in having a shorter tibia. BOULENGER's specimens all came from farther south while BOCOURT's was said to be from the type locality "Mexico", so that it cannot be held that the Mexican specimens indicate a separate race. It seems highly probable that BOCOURT's measurements were faulty or his specimen abnormal, for there are apparently no other characters in which his specimens differ from ours or those described by BOULENGER. From the fact that the species had not otherwise been known from Mexico, COPE<sup>1)</sup> concluded that BOCOURT's specimen was wrongly labeled and that WIEGMANN's *A. biporcatus* applied to *A. petersii*, a larger and well known Mexican species. The finding of these specimens in Vera Cruz proves that the smaller form occurs in Mexico, so that there is no reason on this ground for rejecting BOCOURT's identification of *A. biporcatus*.

The two males and one female secured are quite similar in coloration. The ground color above varies from pale to dark oli-

1) in: Bull. U. S. nation. Mus., Vol. 32, p. 31.

vaceous (197, 207 and paler), but has a bronze appearance. It is confined to triangular areas by brown (153, 109, 138) cross bands that have narrower dark reddish brown or black margins. The margins are indistinct on the sides where the bands themselves expand and become obscure but they become more distinct dorsally and are connected on the vertebral line by a distinct short, blackish line. There are seven cross bands, counting the one behind the hind legs and the one on the occiput. The latter differs from the others in being narrower and dividing near the median line, one branch going forward to the eye and downward to the angle of the mouth and the other backward and downward to the ear. The posterior branch may be obscure. The ground color of the head may be the same as that of the body, or the muzzle and the entire upper part may be pale brownish (162 or slightly paler). There is an angular cross band between the eyes that in two specimens is a darker brown (133) than the ground color, but in the third specimen it is but little darker than the latter, being chiefly distinguished by the darker border (110). The legs are crossed by regular but rather indistinct bars. The belly is pale (153c, 0146) and immaculate, except in the female which has the chin and throat marbled with dusky. In the males the pouch is bright red (66, 81), the scales showing as white spots. The rudiment of a pouch in the female is colored as the belly except that the margin is tinged with yellow.

This species was found by F. H. RUTHVEN in the dense woods along La Laja Creek, and it was observed nowhere else. The specimens obtained were near the ground on tree trunks, and were very difficult to see for the coloration formed a very effective case of background picturing. This was accomplished not only by the pattern, but also by color changing, the ground color of each individual agreeing with the color of the bark on which it was found. One specimen taken on a very dark-colored tree trunk was nearly uniformly black above, but this color changed to that described above when the animal was removed.

#### Measurements.

Total length	160	165	190
Head and body	51	52	61
Head length	14	15	17,5
Head width	7	7,5	8,5
Femur	14,5	14	15,5
Tibia	13	13,5	15

*Anolis sallaei* GÜNTHER.

Not uncommon in the forests on the Hacienda de Cuatotolapam.

The specimens obtained conform in structural characters with BOULENGER's description of the species, but as the published descriptions of the color leave much to be desired a brief discussion of the coloration in our material is given. In the males the flanks are usually very pale, being somewhat darker than the belly, occasionally as dark as the back. Along the sides of the back there is in all of the specimens a light yellowish (171, 221) band that begins on the neck in front of the shoulder, the two enclosing a dorsal band that is in all cases darker (162, 138) than the sides, although occasionally but slightly. In all specimens the dorsal band is more or less mottled with pale yellow, which may form rather definite spots or cross bars, and along the vertebral line there is generally an imperfect row of small black spots. The latter may be entirely wanting. Occasionally there is a trace of a pale yellow median line. The color of the back is continued on the head, which may also be blotched with yellow. The occipital plate is usually pale, and in one specimen there is a dark blotch on the top of the snout just in front of the eyes. The sides of the head are like the top except for the following marks: a very pale yellow (153a) band above the mouth and continued through the ear on the neck, separated from the pale color of the throat by a faint, broken line of dark brown; a dark brown band from the eye to the shoulder. In one specimen the pale band is continued along the flanks, and is indicated there in several others. Ventral surface very pale yellow (153a) without markings except on pouch. Ground color of pouch orange yellow (161). A large bright blue (401, 441) spot and a marginal series of small red orange (86, 106) ones.

In none of the females obtained by us is there more than a trace of the lateral light bands present in the males. Altho there is no distinct dimorphism, there being many intermediates, the female specimens may be divided into two lots the extremes of which are very different, — those in which the pale color (153d) of the flanks (itself occasionally quite dark, eg. 162) blends gradually with the (often only slightly) darker color of the back, and those in which the dark (115, 133) lateral head bands are continued upon the body and base of the tail inclosing a broad vertebral band that may or may not be much paler. In the individuals without lateral

dark bands the coloration is otherwise much as in the males except that it is much more uniform. Thus while there may be a pale band above the mouth, this is not continued upon the neck as a well-defined stripe, the dark lateral head stripe is absent or but poorly defined, and dorsal spots, light blotches and a light vertebral line are little in evidence, altho often indicated. In the specimens that have dark lateral bands these are, as already stated, the continuation of the dark lateral head bands. The dorsal stripe may be light or dark ash. In those in which it is darker the color is light or dark ash (162, 172), in those in which it is very light it is bright orange (137). Another mark that is usually present is a Y- or U-shaped one on the occipital region. In one specimen there is a brown transverse band between the eyes, and a short one extending from the supraorbital region upon the head. As in the female of the other group the light band above the mouth is only well defined to the ear. Several specimens of this group have the sides of the belly streaked with brown, and in one the chin and throat are streaked with the same color. In females of both groups the belly is pale as in the males, and the skin between the scales of the low fold that represents the gular sac of the male is orange.

The lizard is apparently quite generally distributed in the region studied. We took it in the groves on the savannah and in the low woods and grassy areas on the flood plains of the streams. Altho it climbs well and is found commonly in the trees, running up and down the latter with great facility, it occurs as commonly near the ground. A favorite habitat is in tall grass. It readily climbs the stems of the latter, and was frequently observed to jump from one stem to another, often making leaps of from 30 to 40 cm.

*Basiliscus vittatus* WIEGMANN.

Found in numbers along all the streams and deep lagoons between the Arroyo Negra and the San Juan River, and at Lake Catemaco.

The specimens of this species obtained agree closely with BOULENGER'S<sup>1)</sup> description. The principal variations are in the development of the crests and in the color. The former, as is now well known, vary with the sex and age of the individual. In none of the females is the head crest more than a dermal flap that lies upon the nape, but in the males it consists of a large elevated

1) Catalogue of Lizards in the British Museum, Vol. 2, p. 109.

dermal structure that is supported anteriorly by the extension of the bony crest that rises from the parietal region of the skull. In a male 642 mm long the dermal flap is 23 mm long from the anterior end on the neck to the tip. In the young males between 400 and 450 mm in length the bony ridge is just beginning to show externally as a ridge, but the dermal part of the crest is quite well developed, while in the females of the same size the dermal fold is quite small. The variations in the dorsal crest are somewhat different for, whereas in the adult males it is relatively well developed (13 mm at the highest point in a specimen 642 mm long) and is very low in the adult females, in the young specimens between 400 and 450 mm it is very low and about equally developed in both sexes.

In color our specimens show much less variability than one would expect from some of the published descriptions. In specimens of both sexes and various ages (length 144 to 645 mm) the ground color above is olive with more or less of a yellow tinge (193, 212 and 262), becoming brown (179) above the upper stripe. The stripes are usually dull on the body (143, 163 and 172), but in the smallest specimen (144 mm) the lower one is bright throughout its length. In some specimens the stripes are also dull upon the head and neck, but they are as often decidedly lighter, being some shade of yellow (227, 246 and 256) or even white. The same is true of the stripe that is usually found on the middle of the head. In the only very small specimen (144 mm in length) that we have, the stripes are white on the head and neck, the median head stripe being also well developed. In none of the older specimens are these stripes so bright, but in some of the largest individuals they are lighter than in the medium sized ones. The black cross bars are very distinct in all our specimens except in some of the oldest males, in which they are broken up. The ventral surface is a pale yellow in every specimen. On the belly there are small patches of pale slate or pale brown, and the throat and chin are much blotched with these colors, in some specimens to the nearly complete exclusion of the yellow ground color. In several old males the belly is washed with dull red (53d and 53b), but none of the males examined had any red on the crest or tail as stated by SUMICHRIST.<sup>1)</sup>

We found the *Basiliscus* a common lizard along the streams and

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1) in: Ann. Mag. nat. Hist., Vol. 13, 1864, p. 505.



deep water lagoons and lakes. It prefers the shores that are wooded and is seldom seen where these have been cleared. Its favorite habitat is the bushes overhanging the water, but it always remains near the ground or the water, that is, it does not climb to the higher branches of the trees. When alarmed it throws itself from the bushes and dashes away through the shallow water, seeking refuge along the bank. Where the stream or lagoon is narrow it may cross it, and twice I observed frightened individuals rush across a deep stream ten to fifteen meters wide.

When running through the bushes or slowly in an open area locomotion is on all four legs, but when moving rapidly through open spaces and always when running through the water the body is raised upon the hind legs, and the tail is slightly up curved and held in the air. This method of locomotion is a very advantageous one for a lizard occupying the habitat that *Basiliscus* does. From the bushes overhanging the water retreat from land animals can only be had by swimming or running through the mud and shallow water along shore. We flushed scores of individuals and never saw one swim; always they jumped from the bushes and dashed away through the water on their hind legs. In this connection it is interesting to note that the hind legs are very strongly developed and that it is these limbs alone that bear the dermal lobes and the small webs between the first and second digits. These may be considered as adaptations to riparian conditions. The strong hind limbs are capable of carrying the body for a considerable time, and the dermal lobes and webs keep the animal from sinking in the soft mud and function as paddles when the feet do not touch bottom. In the ones observed to cross deep water the hind feet were moved exactly as on the land, and so rapidly that the body could not sink i. e., the animal literally ran through the water on its hind legs. This differs from SUMICHRAST'S<sup>1)</sup> account that "in swimming, he raises the head and breast; his fore feet strike the water as oars, whilst his long tail furrows it like a rudder". We could not determine whether or not the fore feet were used when in deep water, but it was quite evident that they were relied upon but little if at all, the hind limbs being the principal organs of locomotion, and it was not apparent that the tail functioned in any degree as a rudder. The statement of GABB, as quoted by COPE<sup>2)</sup>, that the animal runs

1) l. c., p. 505.

2) in: Journ. Acad. nat. Sc. Philadelphia, 1875, p. 125.



over the surface of the water like a spider also fails to convey an accurate idea of the method of progression through the water.

An examination of the stomachs of a number of specimens reveals principally insects. A few blades of grass, flakes of bark and seeds are also present, but in such small quantities as to warrant the conclusion that they were picked up accidentally. This harmonizes with the observations of DITMARS<sup>1)</sup> on captive specimens, but not with BOULENGER'S<sup>2)</sup> statement that the genus is herbivorous.

*Iguana iguana rhinolopha* (WIEGMANN).

Very common along the streams between the Arroyo Negra and the San Juan River. It was not observed at Lake Catemaco, and we could find no natives who had seen it there.

As was to be expected the specimens obtained are referable to the variety, all of them having the spines on the snout. The number of spines on the neck and body in ten individuals varies from 47 to 56, the average number being 51.

The *Iguana* is preeminently a riparian species in the region studied. With the exception of a few young specimens it was not observed elsewhere than on the immediate banks of the streams or along the deep water lagoons on the flood plains. Young individuals were occasionally observed several hundred yards from the water on the river flood plains, and in one instance a young one was observed a hundred yards from a shallow pond on the prairie and several miles from a large body of water. The form is also preeminently arboreal, its favorite haunt being the limbs of trees that overhang the water. When first alarmed they endeavor to escape observation by becoming quiet, and they are then to be observed only with great difficulty. This is due partly to the fact that the green predominating in the coloration harmonizes with the foliage and partly to the counter-shading. The counter-shading is slight, but very effective. The writer has often, at a distance of five or ten feet, closely examined bushes containing several iguanas before seeing one (generally revealed by a slight movement), and then observed the inconspicuousness to be in great part due to the fact that the delicate counter-shading destroyed all evidence of thickness, the animal appearing as if cut out of card board. When further alarmed

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1) Reptiles of the World, p. 133, New York.

2) Catalogue of Lizards in the British Museum, Vol. 2, p. 3.

from the land they throw themselves headlong into the water, often from heights of from 25 to 40 feet. When they strike the water they sink like a plummet, and are not seen again. In places where trees overhang the water in numbers, particularly along the San Juan River, we would often cause a rain of iguanas by walking through the jungle along the bank. Quite frequently they were observed on the ground, but when surprised in this situation they at once took to the trees before throwing themselves into the water. When surprised from the water we found that they would not always throw themselves into the water but often rush back into the vegetation on the bank.

The stomachs examined contain only vegetable matter, principally leaves.

*Ctenosaura acanthura completa* (BOCOURT).

Not uncommon on the Hacienda de Cuatotolapam, but not observed in numbers.

The specimens obtained exhibit few differences among themselves, and do not agree with the descriptions and the specimens that I have before me of typical *acanthura*. In the Cuatotolapam specimens the dorsal scales are larger, and the spines on the caudal verticles decidedly stronger than in typical *acanthura*, so that they agree with the *C. cycloides* and *C. completa* of BOCOURT and BOULENGER's variety *c.* The uniformity of our material and the fact that the specimens referred to *completa* by authors have mostly come from southern Mexico and Central America, while the typical *acanthura* material is mostly from more northern localities, seems to indicate that the former is to be recognized as a geographic variety. The data at hand at least justify the tentative recognition of the southern Mexican material as a subspecies.

The habits of the individuals observed by us are so different from the description given by DITMARS<sup>1)</sup> as to suggest either that there are racial differences or that individuals vary in habits in different environments. Our observations agree with those of SUMICHRAST<sup>2)</sup> in that we found the form to be decidedly arboreal, mostly residing in the large trees. The latter frequently have one or more large cavities and into these the lizards retreat when alarmed. Only

1) Reptiles of the World, p. 141—142, New York.

2) in: Ann. Mag. nat. Hist. (3), Vol. 13, p. 502—503.

a few were observed on the ground, and this where the timber had largely been cleared away. However, they prefer the more open places, and we found them generally in the clumps of trees on the savannah (Fig. 7), or where the timber had been partially removed on the lowland (Fig. 4). At least at this season, each individual is closely confined to the tree which it has chosen for its home. During the two months that we were in the field there were quite constantly under our observation several trees each of which had its comb lizard occupant, and it was only very rarely that we failed to see the latter when we approached the tree. They were frequently observed clinging head upward to the bark on the trunks of the trees, often occupying the same position for hours at a time.

As stated above, it may be that in other regions this lizard is more terrestrial in habits, or the difference may be racial, typical *acanthura* being more terrestrial than *completa*. In support of the latter explanation it may be significant that the claws in the Cuatotlapam specimens are decidedly shorter than in the *acanthura* specimens that I have been able to examine, apparently having been worn down by the constant climbing. However, this is not conclusive proof of a racial difference between the two forms, as a large enough series is not at hand to make it certain that this does not vary in the same form in different regions. The habits should be investigated for they will throw light upon the relationships of the two forms.

The stomachs examined contain principally vegetable matter, mostly leaves. A few insect remains are determinable, but they form only a very small part of the contents.

### *Sceloporus variabilis* WIEGMANN.

With *Ameiva undulata* the most common ground lizard on the plains and about Lake Catemaco.

Our material needs little description as it agrees closely with the descriptions of BOULENGER<sup>1)</sup> and STEJNEGER.<sup>2)</sup> In life the ground color above is dull brownish olive (129, 133, 138, 162), the lateral stripes dull orange yellow (162, 178d), the median stripe pale brownish olive (167, 172), and the light margin of the shoulder spot light orange or orange yellow (121, 161). As is well known, the stripes

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1) Catalogue of Lizards in the British Museum, Vol. 2, p. 236—237.

2) in: Proc. U. S. nation. Mus., Vol. 14, p. 485—488.

and dorsal spots vary in distinctness, but they are present in all of our material (47 specimens), even in the largest males. The red spots on the abdomen of the males are always very pale (21, 28c) and the blue borders are likewise pale (403d, 403c). I find no account in the literature of the fact that the adult females generally have the lips, sides of the neck, and more or less of the sides of the head bright orange red (82). This color is not present in the young, is only occasionally indicated in the males, and is absent in some of the adult females, but it is present in nearly all of the latter. It disappears rapidly in alcohol, and probably seldom persists in specimens that have been preserved for any considerable length of time.

Like *Ameiva undulata*, this species seems to prefer the more open habitats. It is generally associated with the former in the thickets on the savannah, in the cane fields, in the more open places along the rivers, and in the artificial clearings. We did not observe it, however, in the dense woods where *A. undulata* is occasionally found, but we did find it commonly in more open places than are usually frequented by that species. The explanation lies in the fact that, although a ground lizard, *S. variabilis* climbs easily on fallen logs, and is very much at home where these are present. Its natural habitat seems to be the margins of the jungle.

The contents of the stomachs examined consist entirely of insects.

### *Ameiva undulata* (WIEGMANN).

Very common on the plains, and in the mountains about Lake Catemaco. With *Sceloporus variabilis* the most common ground lizard in the region.

There is relatively little individual variation in the large series obtained. In both sexes there is a broad vertebral band of dark reddish brown or reddish olive (89, becoming 84 toward margin; 109, 118, 129, 130, 169). This band is often variegated with black that may form a more or less well defined marginal band. The ground color of the flanks is usually blackish, frequently more or less dark chestnut (118), and extends on the sides of the belly. The ground color of the upper side of the limbs is either like that of the sides or somewhat more brownish, and there are irregular lighter spots near the color of the vertebral band. The sides of the hind limbs are spotted with bluish like the flanks. The sides of

the belly and the under surface of the hind limbs are pale bluish or greenish blue (341, 361, 366, 371, 416, 421) that is restricted to spots along the sides where encroached upon by the dark color of the flanks. Toward the middle the belly becomes paler, occasionally clear white, but usually tinged with blue (0421) and sometimes with yellow. The chin and throat are generally colored like the middle of the belly, but may be yellow or red in old males (see below).

In the females the vertebral band is margined with a narrow light line of pale olive usually with a yellowish tinge (212, 262) that is generally but poorly defined above and frequently obsolete posteriorly. On the sides there is another light stripe which is frequently of the same color as the one along the dorsal band but more often more greenish or bluish (342). This stripe extends from the upper margin of the ear to the thigh and is continued behind the hind leg upon the tail. It is generally well defined but is occasionally broken up into spots. Below this stripe there is evidence of another from the lower margin of the auricular opening to the hindleg. Altho occasionally entirely wanting the light markings that indicate the position of this stripe are generally in the form of irregular spots that not infrequently fuse with those representing the stripe above to form wavy vertical bars. They are only rarely fused longitudinally into a definite stripe, except in very young individuals. The color of these markings is generally about the same as the stripe above (342) but occasionally decidedly yellowish (261).

The males differ from the females in that the light margin along the dorsal band and the upper lateral stripe are absent, except for occasional traces of the latter in the form of a faint stripe or a series of spots, and in having a broad light band in the space that would lie between these stripes if present. This band is usually greenish blue (361, 362) but occasionally more greenish (317, in one specimen 267 tinged in places with red), extends from the neck to the tail, and is usually complete, only occasionally being broken up into large spots. As in the females there is a series of light spots low on the sides, and these are frequently extended upward and downward, connecting with the spots representing the row above, when present, and with those on the sides of the belly to form vertical bars. These markings are generally greenish blue like those above, but they may be more yellowish (202). In old males the chin and throat are frequently bright yellow (202, 236) or bright reddish orange (86). In one specimen they are slate (372).



The young differ from the females in having brighter stripes.

The females in the collection have on an average fewer femoral pores than the males, but occasional females have as many as the maximum number (21) exhibited by the males, while some males have as few as 15, the minimum number for the series (male, female) being 14. The average numbers in a suite of 32 specimens (17 females and 15 males) are 15.7 for the females and 18 for the males.

SUMICHRAST<sup>1</sup>) states that the Ameivas rarely leave the interior of woods and are never seen in barren places. This statement is too general. We found *A. undulata* to be very widely distributed in the region studied, occurring in the jungle, in the cane fields, in the cleared areas along the streams where there was grass and bushes, and in the thickets of low bushes on the savannah. Furthermore, it was more abundant in the open places than in the woods. It should be said, however, that it was seldom observed in the most open places, i. e., on the savannah grassland and in cleared areas where there were no bushes and where the grass was short, but seemed to prefer thickets of low bushes in sunny places and the margins of the forest. They were very common in the cane fields.

The stomachs of the several specimens examined are all gorged with insects and contain nothing else.

### *Cnemidophorus deppei* WIEGMANN.

Apparently rare; only three specimens secured — on the Hacienda de Cuatotlapam.

The specimens obtained are more or less distinctly 9-striped. In the adults the first three stripes are distinct, but the fourth on either side is only indistinctly separated from the central, the three forming a broad mid-field which is only slightly duller in color than the stripes. In the single young individual the fourth pair of stripes is distinctly separated by a narrow band of black from the mid-stripe, which is dark olive like the top of the head.

The three specimens taken were found in a thicket of low bushes on the savannah near the San Juan River. In this thicket, which was about 100 meters in diameter, there were scores of *Ameiva undulata*, but these three specimens of *C. deppei* were the only ones seen. That they were really rare in this habitat and not merely overlooked was shown by the fact that the thicket was worked thoroly,

1) Quoted by GÜNTHER, in: Biol. Centr.-Amer., p. 25.



and the three specimens were taken on different days in almost exactly the same place.

*Mabuya agilis* (RADDI).

Only observed a few times at Cuatotolapam.

Although seldom observed, it is probable that this species is not rare on the plains; its apparent scarcity being due to the retiring habits.

In the two specimens obtained, the broad dorsal band is olive brown (129, 110), growing paler on its margins to form an indefinite stripe; the sides are black, the lateral stripe pale yellow or orange (216, 146) on the neck and head, becoming somewhat more greenish on the body, and the ventral surface is white. In one specimen there are dark spots on the dorsal scales, that form six faint longitudinal lines.

We could find out nothing definite about the habits of this little skink. Two were seen on logs in cleared places and another on the ground in a cane field.

*Constrictor constrictor imperator* (DAUDIN).

2 specimens at Cuatotolapam. Said to be not rare in the region.

The specimens secured are a male and female and measure 1670 mm and 1470 mm respectively. The tail of the male is 217 mm and that of the female 147 mm in length. The scutellation is as follows:

Scutellation of *Constrictor constrictor imperator*.

	Male	Female
Upper labials	19	18—19
Number of scales across forehead	14	15
Number of scales about eye	17	17
Dorsals	51 (on neck)	57 (on neck)
"	63 (maximum)	71 (maximum)
"	33 (at anus)	35 (at anus)
Ventrals	238	238
Subcaudals	59	53

There are twenty three dorsal blotches on the body.

The male exhibits well-developed claws on either side of the

anus, but in the female these are so small as to protrude but little beyond the scales. WILDER<sup>1)</sup> states that these "are of considerable use in climbing trees". This is certainly not true in this boa at least.

The specimens obtained were found by enganchados in the cane fields.

*Thamnophis sauritus proximus* (SAY).

2 specimens captured about the pools on the savannah at Cuatutolapam.

The 2 specimens obtained are typical *proximus* as it occurs in southern Mexico. It is interesting to note that the number of ventrals (153 and 158) and subcaudals (92 and 95) falls within the limits of variation shown by the material from this region, and confirms the conclusion advanced by the writer<sup>2)</sup> that the form is dwarfed in this part of its range.

The only individuals seen were about the margins of ponds on the savannah. It is not improbable that it also occurs along the streams and that the dense vegetation caused us to overlook it in that habitat.

*Spilotes corias couperi* (HOLBROOK).

Apparently the most common snake in the region. Found at Cuatutolapam and Lake Catemaco.

The specimens obtained seem to show that there are not sufficient grounds to warrant the separation of Mexican and North American examples or to unite these with the typical *S. corias* of South America. In all of our specimens the posterior half of the body, both above and below, is black. In the paler ones the anterior part of the back is dark brownish olive (155) and the black cervical mark is rather distinct, but even in these specimens the olive ground color is more or less spotted with black, while in the darker individuals the back is nearly entirely black, the olive being little in evidence and the cervical mark obscured. The dark specimens differ from North American examples only in the extent to which the black of the posterior part of the ventral surface extends forward. In the pale specimens in our series the blue-black of the

1) History of the human body, p. 166, New York, 1909.

2) in: Bull. U. S. nation. Mus., Vol. 62, p. 106.

ventral surface of the tail and posterior part of the body becomes paler (dark slate, 424) anteriorly. At the end of the anterior third of the length the yellow (216) is discernable but only becomes dominant on the anterior fourth or fifth of the length, confining the dark color to the ends and margins of the scutes. In the darker examples dark slate (424) remains the dominant color anteriorly, and the yellow is confined to the base of the scutes. It is a short step from this coloration to that of North American individuals in which the black of the ventral surface extends to the throat.

The scutellation and proportions of the four individuals obtained is given in the following table.

Scutellation and proportions of  
*Spilotes corias couperii*.

Dorsals	17—15—14	19(on neck)—17—15	17—15	17—15
Upper labials	8	8	8	8
Lower labials	9	8	9	8—9
Oculars	1—2	1—2	1—2	1—2
Temporals	2—2	2—2	2—2	2—2
Caudals	66	72	67	67
Ventrals	196	195	195	193
Total length	1511	2184.4	2160	—
Tail length	266.7	399.7	338	broken
Sex	♀	♂	♀	♀

We found this snake quite generally distributed in the region. It was observed in the cane fields, on the savannah, in the woods (Lake Catemaco) and in the thickets about the shores of ponds and along the streams. It was nearly always observed on the ground, but it also climbs to some extent as we saw one sunning itself at full length on the tops of bushes along the Hueyapam River, four or five feet from the ground. It also enters the water to some extent, as the writer observed two individuals hunting in the high grass and bushes about the margin of a pond, and the stomach of one of these contained, besides three mice, two small snapping turtles and two toads (*Rhinophrynus dorsalis*). The latter were breeding in the pond.

*Leptodeira personata* COPE.

A single specimen at Cuatutolapam.

The scutellation of this specimen, a female, is as follows: dorsal

scale rows, 21—23—21—19—17; upper labials, 8; lower labials, 9—10; preoculars 1, with a small subocular; postoculars 2; ventrals 175; subcaudals 57. The tail is broken at the tip but it is evident that not much more than the tip is wanting. The total length is 552 mm of which the tail constitutes 98 mm.

The specimen was found under a log on the margin of a pond in a grove on the savannah.

*Oxyrhopus petolaris* (LINNAEUS).

A single specimen taken at Cuatotolapam.

The specimen obtained is referable to BOULENGER's variety D, as the body is banded with red and black, the latter forming annuli (connected with each other ventrally) on the tail. There are, however, but 23 annuli on the body, and the red areas are a little broader than the black. The first light band (on the occiput) is yellow.

The scutellation of this individuals is as follows: dorsal rows 19—17; upper labials 8; lower labials 10—11; preoculars 1; postoculars 2; temporals 2—3 (the lower first temporal on each side divided transversely); ventrals 198; subcaudals 89.

Nothing could be learned of the habits of this snake. The specimen was captured by a peon somewhere on the Hacienda de Cuatotolapam.

*Erythrolamprus imperialis* (BAIRD et GIRARD).

2 specimens found on the margin of a pond on the prairie at Cuatotolapam.

The specimens obtained need little description as they are quite typical. It should be mentioned that there are only four lower labials in contact with the anterior chin shields (cf. BOULENGER).<sup>1)</sup>

The scutellation is as follows: dorsal rows 19—17, upper labials 8; lower labials 9; ventrals 125 and 129, subcaudals 77 in one, the tail being broken in the other. The specimens are about the same size, and the one with the complete tail measures 360 mm.

The two specimens obtained were the only ones seen. They were found under logs on the edges of ponds on the savannah. GÜNTHER<sup>2)</sup>

1) Cat. of Snakes in Brit. Mus., Vol. 3, p. 206.

2) in: Biol. Centr.-Amer., p. 162.

states of *fissidens* (*imperialis* in part) that it feeds upon frogs. This is not unlikely as small toads and frogs are not uncommon about these ponds. The female has large eggs in the oviducts.

*Elaps fulvius* (LINNAEUS).

Rather common at Cuatutolapam. Known by the name "coralilla".

The specimens obtained are referable to BOULENGER's varieties B and C. On the body there are 17 to 21 narrow black annuli widely separated by red interspaces and only imperfectly margined with yellow. The red bands are profusely spotted with black.

Nothing was learned of the habits of this snake. The only specimens seen were in the cane fields and about the hacienda buildings. The three immature specimens found about the buildings were under boards.

*Lachesis lanceolatus* (LACÉPÈDE).

Observed both on the plains and in the mountains and said to be not uncommon in both regions. Locally known as the "sorda".

The single specimen (a female) obtained is *lanceolatus* as described by BOULENGER, the keels of the dorsal scales being nearly as long as the scales. The scutellation is as follows: dorsal scale rows 23—25—23—21—19; upper labials 8; lower labials 10; preoculars 2; ventrals 213; subcaudals 65. Total length 1820 mm, tail 205 mm.

This species is frequently found in the cane fields and is the most dreaded serpent in the region. The specimen obtained had recently eaten four or five squirrels.

*Crocodilus americanus* LAURENTI.

Common in the rivers and ponds of the region and also in Lake Catemaco. Known locally as "El Lagarto".

A series of eleven specimens ranging from 250 mm to 1900 mm in length was secured. Of the many adults seen none seemed much longer than two meters. Two were seen in Lake Catemaco that perhaps exceeded this length, but they were certainly not longer than three meters.

They were found everywhere in the streams and larger ponds. The young ones, about 250 to 300 mm in length, were observed in schools. They came out on the mud flats to sun themselves, and when alarmed would rush into the water and generally seek refuge in the brush near shore; they were often discovered to us by the

sharp bark they gave when alarmed. The older ones were more solitary and were usually observed singly along the banks of the streams or ponds where they had favorite places for hauling up (Fig. 8). A long shallow lagoon near the San Juan River, the Laguna de Chacalapa, literally swarmed with individuals from one to two meters long. This lagoon contained few if any fish but opened into a large shallow marsh that teemed with waterfowl, which probably afforded an abundance of food.

*Dermatemys mawii* GRAY.

A single specimen taken in the San Juan River and another dead along the Arroyo Negra at Cuatotolapam. Called "tortuga blanca" by the natives. The latter informed us that the "tortuga blanca" was not uncommon in the San Juan River, but we were unable to secure any other specimens, owing to the high water at this time of the year.

These 2 specimens are of adult size, and their carapaces measure 460 mm in length. The specimen taken in the San Juan River had the alimentary tract full of vegetable matter.

*Staurotypus triporcatus* (WIEGMANN).

A live specimen was taken in the San Juan River and the shell of another along the Arroyo Negra, at Cuatotolapam. Said to be not uncommon in the San Juan River.

The 2 specimens obtained are of about the same size, and the carapace of the larger one measures 374 mm in length.

*Claudius angustatus* COPE.

A single specimen taken at Cuatotolapam.

The length of the carapace in the specimen obtained is 107.5 mm, the width 70 mm.

The species is probably not uncommon at Cuatotolapam. The only two specimens observed were found wandering about on land, one on the prairie, July 31, and one in the cane fields, August 9. COPE<sup>1</sup>) states that the food is "small fish, crustaceans, snails etc."

*Geomyda punctularia areolata* (A. DUMERIL).

3 specimens from Cuatotolapam.

In life, the light marks on the top of the head, viz., two on the

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1) in: Proc. Acad. nat. Sc. Philadelphia, 1865, p. 188.



occiput and one on either side from the frontal region to above the ear, are dark orange red (82); the light spots on the sides of the head, viz., on the upper eyelid and in front of the ear, are pale yellow (221), and the yellow areas on the body are bright (216). There are no markings on the carapace, except in the young specimens; the two young males (129,5 mm and 148 mm in length) have a rather poorly defined yellow stripe on the lower margin of the first three costals, limited to a trace on the fourth costal. The bridge and margin of the plastron are clear yellow (about 246), the middle of the plastron light brown (133) to blackish. The ventral face of the marginals is bluish (267, 272), and generally shows a faint light stripe.

#### Measurements.

Length	129,5 mm	214 mm	148 mm
Width	92,3	148	100

According to our observations this is the common freshwater turtle of the region about Cuatotolapam. Numerous individuals were observed in the Arroyo Negra and in La Laja Creek. 2 specimens were found wandering about on land, on July 15 and August 3.

#### *Chelydra rossignoni* (BOCOURT).

3 immature specimens taken at Cuatotolapam.

Although quite immature (length of carapace 29—31 mm), it is not difficult to identify our specimens as *C. rossignoni*. There are four chin-barbels, the bridge is about one-seventh of the length of the plastron, and the abdominal scutes are not twice as broad as long. Aside from these structural characters the specimens also differ in color from those of *C. serpentina* of the same size that we have examined. The skin of the lower parts with the plastron and ventral surface of the marginals is jet black with pale yellow or orange yellow spots. The black color extends evenly upon the sides of the head except for a trace of a brown band from the eye, and the brown of the top of the head is somewhat spotted with black. In *C. serpentina* the lower parts are greyish or brownish in the immature individuals, and while the ground color of the sides of the head may be black there is usually a prominent light band from the eye to the angle of the mouth and frequently other light marks on the sides of the muzzle and head. Furthermore, the top of the

head in the specimens of *C. serpentina* that we have examined is not as uniformly colored as in *C. rossignonii*, being generally much striped and spotted with black or very dark brown.

The largest specimen obtained was sunning itself on a rock in the Hueyapam River, near the village of San Juan. The other two were removed from the stomach of a large gopher snake (*Spilotes corias couperii*) taken on the shore of a pond in the cane fields.

### Explanation of Plates.

#### Plate 6.

Sketch map of the plains region at Cuatotolapam.

#### Plate 7.

Fig. 1. Forest on the mountains at Lake Catemaco.

Fig. 2. Grove of planted bananas, a favorite habitat of *Hyla baudini*.

#### Plate 8.

Fig. 3. General view of the savannah.

Fig. 4. Large tree in cleared area along Hueyapam River. A favorite habitat of *Ctenosaura acanthura completa*.

#### Plate 9.

Fig. 5. Pool in upper part of La Laja Creek. *Anolis sallaci* and *A. biporcatus* are found in the forest, and *Iguana iguana rhinolopha* and *Basiliscus vittatus* near the water.

Fig. 6. Partially cleared jungle at Cuatotolapam. In the pools and under logs and debris are still to be found many of the amphibious forest types.

#### Plate 10.

Fig. 7. A clump of large trees on the savannah. Showing the umbrella shape taken on in this habitat. Such large trees are favorite resorts of *Ctenosaura acanthura completa*.

Fig. 8. Sand playa along the Hueyapam River. The crocodiles haul out on such places to sun themselves.

## Plate 11.

Fig. 9. La Laja Creek at Cuatotolapam. The dense forest along the banks and the luxuriant growth of the aquatic vegetation is shown. For the characteristic animals of this habitat see table on page 300.

Fig. 10. Guarda Raya in cane field at Cuatotolapam. *Sceloporus variabilis* and *Ameiva undulata* are common in this habitat, with other terrestrial forms from the forest.